

# Grade 4 Math Scoring Guidance

**2015-2016 NYC End-of-Year Performance Tasks**

## Instructions

- The following pages contain guidance on the scoring of the above-named NYC Performance Task.
- Distribute this guide to all staff scoring the task. *Please note: End-of-Year tasks may be administered by the regular classroom teacher but **may not be scored** by the regular classroom teacher.*
- The scoring guidance is intended to be used in conjunction with the rubric, which details indicators of performance levels on all rubric traits.

# Overview of the NYC Performance Tasks

The NYC Performance Tasks are comparable baseline and End-of-Year, open-ended assessment pairs that are offered in math, ELA, science, and social studies and promote the instructional shifts of argument and critique, use and analysis of evidence, and exposure to complex texts. The tasks are designed for students to demonstrate their skills in reviewing and analyzing presented evidence and creating an evidence-based argument.

The tasks respond to and support the diversity of curriculum and instruction that exist across NYC schools and act as a resource in these varied settings to support collaborative discourse around curriculum, instruction, and assessment. Tasks are designed to support the Citywide Instructional Expectations by promoting knowledge of students, facilitating alignment to an instructional focus, and developing a culture of collaborative professional learning.

A skills-based, standards-driven rubric accompanies each task and, where feasible, is content agnostic so that it can be used in a variety of ways with other curricular and instructional materials. Rubrics are aligned to the Common Core standards and content-specific New York State standards where appropriate. Topic selection in each grade and subject was influenced by New York City scope and sequence documents.

The following scoring guide structure was adapted from CPET and provides annotated student work samples that show the relationship between the student response and the criteria in the rubric. A matrix of rubric scores and rationales follows each individual student work sample. The guide can also be used to norm scoring practices across teams of educators.

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## Design Principles for the Math Performance Tasks

### Focus Standards

While there may be multiple Common Core standard alignments (partial or full) for each trait in the rubric, the focus standards are used to inform design consistency across grades. In math, the Practices are used as the unifying design principle across grades in lieu of content standards. Grade-level content standard alignment is represented on each rubric.

- MP1: Make sense of problems and persevere in solving them
- MP4: Model with mathematics

See the last page of this guide for a chart of standards alignment per rubric trait across all grade levels.

### Design Concept

The design concept for math addresses the following in each grade band:

Grades K-1

- Inventory

Grades 2-12

- Presentation of context
- Multiple mini-task questions addressing that one context

### Content and Structure

The topic (e.g., "plants") in each task is used to provide context for students to demonstrate mastery of the focus standards and content standards in math. The design of the task is not for students to demonstrate content knowledge on any particular topic. The content standards chosen represent the major work of the grade, and are structured to measure both discrete and complex skill mastery. Unlike other subject area rubrics, rubric traits in math measure the total allowable score points per question; therefore, not every trait on the rubric has descriptors through four points.

# Grade 4 Math Scoring Guidance

## Task Overview

NYC Mathematics Performance Tasks are mathematics tasks in which students are presented with a series of connected questions. Each question on the task is intended to address understanding and proficiency of mathematical content, as well as engagement with mathematical practices.

### Student Task

Students produce **a numerical** and/or written response. Sample student responses have been provided to you; further information regarding these annotated student works are provided below.

### Evaluator Task

You are being asked to use your best, professional judgment to score these student responses using the rubric provided.

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## General Instructions for Using the Rubric

- (1) Scorers will use the separate rubric provided to assess student performance.
- (2) These traits are being scored for content and practice. Point values may vary from question to question, and there is no eligible point value for areas on the rubric that are blank.
- (3) You are to provide one score for each rubric trait. Please be sure to enter all trait scores on the appropriate Schoolnet Answer Sheet for each student. The final score for the task will be calculated elsewhere.
- (4) All student work in the task booklet should be scored, regardless of whether the student completed or attempted every question.
- (5) A score of “Zero (0) – No attempt” should be considered carefully before being used. See included student work samples for guidance. Scores of “Zero (0) – No attempt” should only be given if:
  - (a) a student did not attempt that question on **any portion** of the task, or
  - (b) if his/her work is **completely copied** directly from the task or texts, or
  - (c) if his/her work is completely unrelated to the question or prompt.

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## Annotated Student Work

The following pages include annotated student work samples at a variety of performance levels. The samples have been annotated to highlight student responses in relation to the rubric traits. Each sample is followed by a summary page indicating the sample’s score on each rubric trait, in addition to the reasoning for the score. Please review these samples both independently and **with a team** to ensure a common understanding of the rubric traits at all performance levels.

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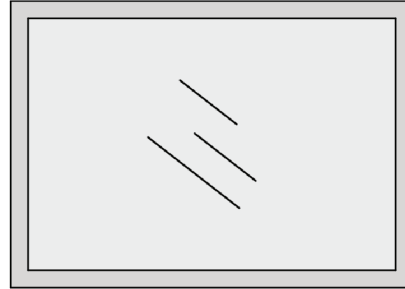
## Best Practices for Scoring

- Before scoring a specific task, teacher **teams** should review the task and the rubric and discuss expected performance at each level for each rubric trait.
- As a group, review annotated student work and **discuss evidence for each score**, including discussing non-blank, zero-scored traits. Work to understand the provided scores and rationales for one sample.
- Individually score a few provided student work samples. After working individually, **compare your assigned scores** to those given by others and to the provided scores and rationales. Be sure you understand how each score was assigned, and that your team agrees, before moving to independent work.
- After independently completing a set of student work from your school, review the set with the group to see if you have drifted away from your original scoring, becoming either more severe or more lenient in response to the task. Consistent scoring is important.



## Wendy's Windows

Wendy has just started a new business making windows for houses. The homeowner tells Wendy the measurements of the window, and she makes the glass and the frame. Wendy has decided that she should keep track of the measurements for each window she makes.



Wendy has started a table with some of the sizes of the windows she makes, but the table is incomplete.

**Window Sizes**

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

**1 Compare Window A (2 feet by 4 feet) and Window D (6 feet by 8 feet):**

**How much longer is the perimeter of the larger window?** 16 **feet longer**

**How many times larger is the area of the larger window?** 6 **times larger**

$$\begin{array}{r} 28 \\ - 12 \\ \hline 16 \end{array} \quad 48 \div 8 = 6$$

T1

The response demonstrates a correct process for finding the difference in perimeter and area for the two rectangles. The response shows an understanding of solving problems involving multiplicative vs. additive comparison and distinguishing the difference.



Window Sizes

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

2 What is the length of Window C?

18 feet

Show your work.

$$2 \times 72 = 144$$

$$4 \times 36 = 144$$

$$8 \times 18 = 144$$

T2

The response demonstrates a correct process for finding the length of a rectangle with a width of 8 feet and an area of 144 ft<sup>2</sup>. The response shows an understanding of applying the area formula for rectangles in problem situations. Factor pairs for 144 were used, starting with 2 and 72 until a factor pair with a width of 8 feet was found.

3 What is the length and width of the window with the 96 square foot area?

Length: 8 feet

Width: 12 feet

Show your work.

$$(8 \text{ ft.} \times 2) + (12 \text{ ft.} \times 2) = 40 \text{ ft. perimeter}$$

$$\begin{array}{r} 8 \text{ ft. (length)} \\ \times 12 \text{ ft. (width)} \\ \hline 96 \text{ ft. (area)} \end{array}$$

T3

The response shows a correct process for finding a factor pair of 96 within the context of the problem. The response shows an understanding of solving problems involving area and perimeter by finding a factor pair that will also give a perimeter of 40.



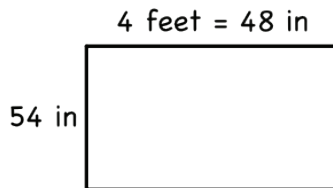
- 4 What is the area, in square inches, of a window that is 4 feet long and 54 inches wide?

2592 square inches

**Show your work.**

1 foot = 12 inches

4 feet = 48 inches



$$\begin{array}{r} 48 \\ \times 54 \\ \hline 192 \\ + 2400 \\ \hline 2592 \end{array}$$

T4

The response shows a correct process for finding the area of a rectangle by multiplying 2 two-digit numbers. The response also shows an understanding of working within a measurement system to express a larger unit in terms of a smaller unit and solving problems that require conversions, such as applying the area formula for rectangles.



One homeowner asked Wendy to make several pairs of small windows for his house. For each pair, the owner would like one window to be square and the other to be one inch longer on one side and one inch shorter on the other side. Wendy makes a table that can be used later to find the cost of the pairs of windows.

- 5a** Find the area of each rectangular window for Wendy so her table will be complete. Write your answers in the table.

Square Windows			Rectangular Windows		
Length	Width	Area	Length	Width	Area
9 inches	9 inches	81 square inches	8 inches	10 inches	<u>80</u> square inches
10 inches	10 inches	100 square inches	9 inches	11 inches	<u>99</u> square inches
11 inches	11 inches	121 square inches	10 inches	12 inches	<u>120</u> square inches

- 5b** If Wendy makes a square window that measures 23 inches long by 23 inches wide, with an area of 529 square inches, what is the area of the rectangular window that measures 24 inches long by 22 inches wide?

528 square inches

**T5**

The response shows an understanding of identifying a pattern and describing how it is generated. The response also demonstrates a correct application of the pattern used to find the area of the 22 in. x 24 in. rectangle. The response also shows fluency with number facts in finding the areas of the rectangular windows from the table.

- 5c** Identify the pattern in the table and explain how you know the area of the rectangular window that measures 24 inches long by 22 inches wide without calculating the actual area.

The pattern in the table is that the areas of the square windows are one more than the areas of the rectangular windows. I know the area of the 22 by 24 inches because if 23 by 23 inches is 529 inches<sup>2</sup> 22 by 24 inches should be 1 less, so 22 by 24 inches is 528 inches<sup>2</sup>.



- 6 When Wendy makes a pair of windows, each window in the pair will be made of different glass. The 8 inch by 8 inch square window has an area of 64 square inches and the glass costs 20¢ for each square inch. The 7 inch by 9 inch rectangular window has an area of 63 square inches and the glass costs 10¢ for each square inch.

What is the total cost of the glass for this pair of windows? \$19.10

Show your work.

$$64 \times .20 = 128 \times .10$$

$$128 + 63 = 191$$

$$191 \times .10 = 19.10$$

T6

The response shows an understanding of using the four operations to solve word problems involving money. The response also shows an understanding of the properties of multiplication by rewriting  $64 \times 0.20$  as  $128 \times 0.10$  to create like units of money, in this case 10¢.

- 7 Wendy has 290 square feet of glass. She would like to use the glass to make windows that each have an area of 7 square feet. She thinks she can only make 39 windows.

However, Wendy is incorrect. Use estimation to explain why Wendy's thinking is incorrect.

Each window is 7 ft<sup>2</sup>. If Wendy has 290 sq ft of glass and a window is only 7 sq ft, she is able to make at least 40.  $7 \times 4 = 28$  Add the other place value you need to make it 100 it equals 280.

$280 < 290$ , therefore Wendy should be able to make 40, and from my estimate, more.

T7

The response shows a correct process for assessing the reasonableness of an answer using estimation strategies, including rounding. The response demonstrates the strategic use of multiples of 10 to compute the number of windows that can be made.



# Sample A - Anchor Paper Commentary

**Subject/Course:** Math

**Task Title:** Wendy's Windows

**Grade Level:** 4

**Year:** 2015-2016

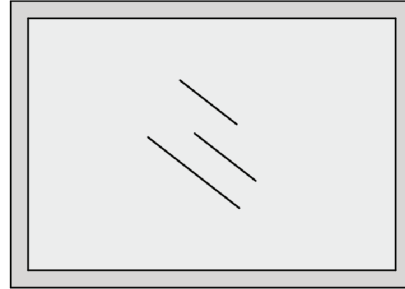
Rubric Traits	Anchor Score	Commentary/Rationale	Maximum Score
<b>T1</b> Trait 1	2	Two correct answers are given, 16 feet and 6 times larger.	2
<b>T2</b> Trait 2	2	A correct answer of 18 feet is given and a correct process for finding the length of the window is shown.	2
<b>T3</b> Trait 3	3	A correct answer of 8 feet and 12 feet is given and a correct process is shown for finding the dimensions of the 96 ft. <sup>2</sup> window, given by $(8 \times 2) + (12 \times 2) = 40$ .	3
<b>T4</b> Trait 4	3	A correct answer of 2,592 square inches is given and a correct process is shown to find the area of the window, converting 4 feet to 48 inches and multiplying the result by 54.	3
<b>T5</b> Trait 5 (a-c)	4	All three correct areas (80 in. <sup>2</sup> , 99 in. <sup>2</sup> , and 120 in. <sup>2</sup> ) are given, as well as the correct area of the 22 in. $\times$ 24 in. window: 528 in. <sup>2</sup> . A correct explanation of the pattern and how the area was found is also given.	4
<b>T6</b> Trait 6	2	A correct answer of \$19.10 is given and a correct process is shown to find the total cost for both windows.	2
<b>T7</b> Trait 7	2	A correct explanation is given using estimation for why Wendy's answer is incorrect.	2

**Score = 18/18, Level 4: Exceeding Standards**



## Wendy's Windows

Wendy has just started a new business making windows for houses. The homeowner tells Wendy the measurements of the window, and she makes the glass and the frame. Wendy has decided that she should keep track of the measurements for each window she makes.



Wendy has started a table with some of the sizes of the windows she makes, but the table is incomplete.

**Window Sizes**

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

**1 Compare Window A (2 feet by 4 feet) and Window D (6 feet by 8 feet):**

How much longer is the perimeter of the larger window? 16 feet longer

How many times larger is the area of the larger window?  $2\frac{1}{3}$  times larger

$$\begin{array}{r} 2\frac{4}{12} \\ 12 \overline{)28} \\ \underline{-24} \\ 4 \end{array}$$

T1

The response shows some understanding of solving problems involving multiplicative vs. additive comparison and distinguishing the difference. Although the multiplicative comparison is used correctly, it is applied to the perimeter rather than the area of the second window, which may indicate a misconception regarding the definition of area and perimeter.



Window Sizes

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
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2 What is the length of Window C?

16 feet

Show your work.

$$\begin{array}{r} 16 \\ 8 \overline{)144} \\ \underline{-8} \phantom{00} \\ 64 \\ \underline{-64} \\ 0 \end{array}$$

T2

The response shows an understanding of applying the area formula for rectangles, viewing the problem as a multiplication equation with an unknown factor and using division to solve. However, a computational error is made, leading to an incorrect answer.

3 What is the length and width of the window with the 96 square foot area?

Length: 8 feet

Width: 12 feet

Show your work.

$$8 \text{ ft.} \times 12 \text{ ft.} = 96 \text{ square feet}$$

T3

The response shows an incomplete process for solving a problem involving area and perimeter by finding a factor pair for 96. It is unclear from the response if there is an understanding that these dimensions will also give a perimeter of 40, since that work is not shown.

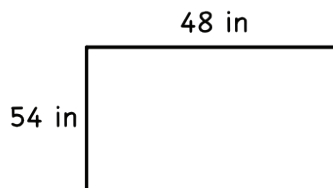


- 4 What is the area, in square inches, of a window that is 4 feet long and 54 inches wide?

2492 square inches

Show your work.

4 feet = 48 inches



$$\begin{array}{r} 48 \text{ in} \\ \times 54 \text{ in} \\ \hline 192 \\ + 2400 \\ \hline 2492 \end{array}$$

T4

The response shows a correct process for working within a measurement system to express a larger unit in terms of a smaller unit, and solving problems that require such conversions, such as applying the area formula for rectangles. The response also shows an understanding of multiplying a two-digit number by a two-digit number, with a computational error at the end.



One homeowner asked Wendy to make several pairs of small windows for his house. For each pair, the owner would like one window to be square and the other to be one inch longer on one side and one inch shorter on the other side. Wendy makes a table that can be used later to find the cost of the pairs of windows.

- 5a** Find the area of each rectangular window for Wendy so her table will be complete. Write your answers in the table.

Square Windows			Rectangular Windows		
Length	Width	Area	Length	Width	Area
9 inches	9 inches	81 square inches	8 inches	10 inches	<u>80</u> square inches
10 inches	10 inches	100 square inches	9 inches	11 inches	<u>99</u> square inches
11 inches	11 inches	121 square inches	10 inches	12 inches	<u>120</u> square inches

- 5b** If Wendy makes a square window that measures 23 inches long by 23 inches wide, with an area of 529 square inches, what is the area of the rectangular window that measures 24 inches long by 22 inches wide?

520 square inches

**T5**

The response shows some understanding of identifying a pattern and describing how it is generated. The pattern is described correctly, yet the area given for the 22 in.  $\times$  24 in. window does not follow the pattern. The response also shows fluency with number facts in finding the areas of the rectangular windows from the table.

- 5c** Identify the pattern in the table and explain how you know the area of the rectangular window that measures 24 inches long by 22 inches wide without calculating the actual area.

The pattern is when you times a number (say 10) against the same number (10) you get the answer (100). But when you take one away from one of the numbers ( $10 - 1 = 9$ ) and add that one to the other number ( $10 + 1 = 11$ ) when you times them together, you get 1 less from your answer before ( $9 \times 11 = 99$ ).



- 6 When Wendy makes a pair of windows, each window in the pair will be made of different glass. The 8 inch by 8 inch square window has an area of 64 square inches and the glass costs 20¢ for each square inch. The 7 inch by 9 inch rectangular window has an area of 63 square inches and the glass costs 10¢ for each square inch.

What is the total cost of the glass for this pair of windows? \$19.40

Show your work.

$$\begin{array}{r} \$12.80 \\ 20 \times 64 = 1280 \\ \\ \$6.30 \\ 10 \times 63 = 630 \end{array}$$

T6

The response demonstrates a correct process for using the four operations to solve word problems involving money. Multiplication is used to find the cost of each window, and then addition is used to find the total cost, which is then converted from pennies to dollars. It is reasonable to assume that a computational error in the addition of \$12.80 and \$6.30 leads to an incorrect answer.

- 7 Wendy has 290 square feet of glass. She would like to use the glass to make windows that each have an area of 7 square feet. She thinks she can only make 39 windows.

However, Wendy is incorrect. Use estimation to explain why Wendy's thinking is incorrect.

$$\begin{array}{r} 39 \qquad 290 \\ \times 7 \qquad - 273 \\ \hline 273 \qquad 17 \end{array}$$

T7

The response does not show an understanding of assessing the reasonableness of an answer using estimation strategies because estimation is not used. The response does show understanding of solving multistep word problems involving the four operations and interpreting a remainder.

Wendy is incorrect because if she made 39 windows she would still have 17 ft<sup>2</sup> of glass left.

With that amount she can make 2 more windows.

# Sample B - Anchor Paper Commentary

**Subject/Course:** Math

**Task Title:** Wendy's Windows

**Grade Level:** 4

**Year:** 2015-2016

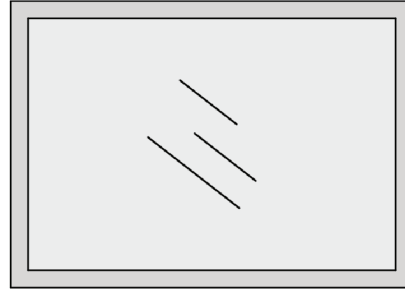
Rubric Traits	Anchor Score	Commentary/Rationale	Maximum Score
<b>T1</b> Trait 1	<b>1</b>	One correct answer is given, 16 feet, and one incorrect answer is given, $2\frac{1}{3}$ times larger.	<b>2</b>
<b>T2</b> Trait 2	<b>1</b>	An incorrect answer of 16 feet is given. A correct process is shown, dividing to find the missing factor, but a computational error leads to an incorrect answer.	<b>2</b>
<b>T3</b> Trait 3	<b>2</b>	A correct answer of 8 feet and 12 feet are given. A correct but incomplete process is shown, with 8 and 12 justified for area ( $8 \times 12 = 96$ ) but not for perimeter.	<b>3</b>
<b>T4</b> Trait 4	<b>2</b>	An incorrect answer of 2,492 square inches is given. A correct process is shown to find the area of the window, converting 4 feet to 48 inches and multiplying this result by 54. A computational error at the end leads to an incorrect answer.	<b>3</b>
<b>T5</b> Trait 5 (a-c)	<b>3</b>	Three correct areas (80 in. <sup>2</sup> , 99 in. <sup>2</sup> , and 120 in. <sup>2</sup> ) are given. A correct explanation of the pattern is also given; however, the area of the 22 in. $\times$ 24 in. window is given incorrectly.	<b>4</b>
<b>T6</b> Trait 6	<b>1</b>	An incorrect answer of \$19.40 is given. However, a correct process is shown, with a computational error in addition leading to an incorrect answer.	<b>2</b>
<b>T7</b> Trait 7	<b>1</b>	An exact calculation is used to show that Wendy is incorrect, given by $39 \times 7 = 273$ and $290 - 273 = 17$ .	<b>2</b>

**Score = 11/18, Level 3: Meeting Standards**



## Wendy's Windows

Wendy has just started a new business making windows for houses. The homeowner tells Wendy the measurements of the window, and she makes the glass and the frame. Wendy has decided that she should keep track of the measurements for each window she makes.



Wendy has started a table with some of the sizes of the windows she makes, but the table is incomplete.

**Window Sizes**

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
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D	6 feet	8 feet	48 square feet	28 feet

**1 Compare Window A (2 feet by 4 feet) and Window D (6 feet by 8 feet):**

How much longer is the perimeter of the larger window? 16 feet longer

How many times larger is the area of the larger window? 40 times larger

**T1**

The response shows an incorrect process for solving problems involving multiplicative vs. additive comparison and distinguishing the difference, as an additive comparison is used in both situations ( $48 - 8 = 40$  vs.  $48 \div 8 = 6$ ). The response may indicate a misconception with regard to the meaning of how many times larger Window D is than Window A.





### Window Sizes

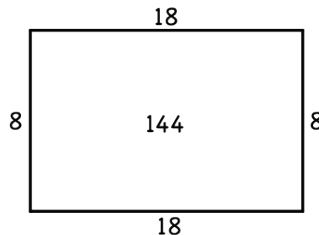
Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

2 What is the length of Window C?

18 feet

Show your work.

$$\begin{array}{r} 18 \text{ sq. ft} \\ 8 \overline{)144} \\ \underline{-8} \phantom{0} \\ 64 \\ \underline{-64} \\ 0 \end{array}$$



T2

The response shows a correct process for applying the area formula for rectangles, modeling the problem as a multiplication equation with an unknown factor, and using division to solve. The strategic use of a drawing also further demonstrates the understanding of area.

3 What is the length and width of the window with the 96 square foot area?

Length: 4 feet

Width: 24 feet

Show your work.

$$4 \times 24 = 96$$

T3

The response shows a partially correct process for solving problems involving area and perimeter using factor pairs by finding a correct factor pair for 96. It is clear from the response that a perimeter of 40 was not accounted for in finding the length and width which may indicate a misconception regarding the context of the problem.



- 4 What is the area, in square inches, of a window that is 4 feet long and 54 inches wide?

204 square inches

**Show your work.**

1 ft. = 12 inches

48 in. = 4 ft.

$$\begin{array}{r} 48 \\ + 48 \\ \hline 96 \\ + 54 \\ \hline 150 \\ + 54 \\ \hline 204 \end{array}$$

T4

The response shows understanding of working within a measurement system to express a larger unit in terms of a smaller unit, and solving problems that require such conversions. The conversion is used to find the perimeter rather than the area, which may indicate a misconception regarding the definition of area and perimeter. The response does not show understanding of multiplying a two-digit number by a two-digit number.



One homeowner asked Wendy to make several pairs of small windows for his house. For each pair, the owner would like one window to be square and the other to be one inch longer on one side and one inch shorter on the other side. Wendy makes a table that can be used later to find the cost of the pairs of windows.

- 5a** Find the area of each rectangular window for Wendy so her table will be complete. Write your answers in the table.

**Square Windows**

Length	Width	Area
9 inches	9 inches	81 square inches
10 inches	10 inches	100 square inches
11 inches	11 inches	121 square inches

**Rectangular Windows**

Length	Width	Area
8 inches	10 inches	<u>80</u> square inches
9 inches	11 inches	<u>99</u> square inches
10 inches	12 inches	<u>120</u> square inches

- 5b** If Wendy makes a square window that measures 23 inches long by 23 inches wide, with an area of 529 square inches, what is the area of the rectangular window that measures 24 inches long by 22 inches wide?

529 square inches

**T5**

The response shows an incorrect explanation of the pattern in the table. The response may indicate a misconception regarding the multiplication of 2 two-digit numbers. There is some understanding of the pattern shown in the observation that the length and width of the rectangle are one more and one less than the side of the square.

- 5c** Identify the pattern in the table and explain how you know the area of the rectangular window that measures 24 inches long by 22 inches wide without calculating the actual area.

I know the answer is 529 without calculation because if 23 and 23 is 529, 22 and 24 because it is like moving one number from the 23 and putting it in the other but it still is the same amount so the answer would still be 529.



- 6 When Wendy makes a pair of windows, each window in the pair will be made of different glass. The 8 inch by 8 inch square window has an area of 64 square inches and the glass costs 20¢ for each square inch. The 7 inch by 9 inch rectangular window has an area of 63 square inches and the glass costs 10¢ for each square inch.

What is the total cost of the glass for this pair of windows? 2630

Show your work.

$$63 \times 10 = 630 \quad 2000 + 630 = 2630$$

$$\begin{array}{r} 64 \\ \times 20 \\ \hline 800 \\ + 1200 \\ \hline 2000 \end{array}$$

T6

The response shows a correct process for using the four operations to solve word problems involving money. Multiplication is used to find the cost of each window, and then addition is used to find the total cost in pennies. From the response it is reasonable to assume that a computational error when multiplying  $20 \times 4$  leads to an incorrect answer.

- 7 Wendy has 290 square feet of glass. She would like to use the glass to make windows that each have an area of 7 square feet. She thinks she can only make 39 windows.

However, Wendy is incorrect. Use estimation to explain why Wendy's thinking is incorrect.

The number 7 goes into 280 40 times ( $7 \times 40 = 280$ ), so it would go into 290 more than 40

times. Wendy said it would go in 39 times but no.

T7

The response shows a correct explanation for assessing the reasonableness of an answer using estimation strategies, including rounding 39 to 40 for the purposes of comparing the products of  $7 \times 39$  and  $7 \times 40$  with 290.

# Sample C - Anchor Paper Commentary

**Subject/Course:** Math

**Task Title:** Wendy's Windows

**Grade Level:** 4

**Year:** 2015-2016

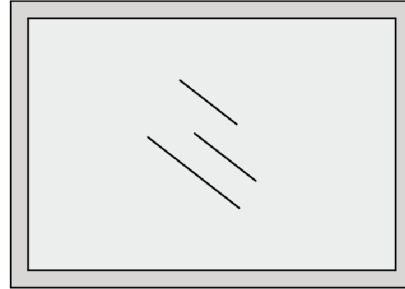
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<b>T1</b> Trait 1	<b>1</b>	A correct answer, 16 feet, is given, and one incorrect answer, 40 times larger, is given.	<b>2</b>
<b>T2</b> Trait 2	<b>2</b>	A correct answer of 18 feet is given and a correct process for finding the length of the window is shown.	<b>2</b>
<b>T3</b> Trait 3	<b>1</b>	An incorrect answer of 4 feet and 24 feet is given. Although the process shown indicates a rectangle with an area of 96 feet <sup>2</sup> , the length and width do not produce a perimeter of 40 feet.	<b>3</b>
<b>T4</b> Trait 4	<b>1</b>	An incorrect answer of 204 square inches is given. A correct process is started, converting 4 feet to 48 inches. The conversion is used to find the perimeter rather than the area.	<b>3</b>
<b>T5</b> Trait 5 (a-c)	<b>2</b>	Three correct areas (80 in. <sup>2</sup> , 99 in. <sup>2</sup> , and 120 in. <sup>2</sup> ) are given. The area given for the 22 in. × 24 in. window is incorrect. There is not enough of a correct explanation of the pattern from the table to demonstrate understanding of the application of the pattern.	<b>4</b>
<b>T6</b> Trait 6	<b>1</b>	An incorrect answer of 2,630¢ is given. However, a correct process is shown, with a computational error given by $64 \times 20 = 2000$ , which leads to an incorrect answer.	<b>2</b>
<b>T7</b> Trait 7	<b>2</b>	A correct explanation is given, using estimation for why Wendy's answer is incorrect by rounding 39 to 40, using $7 \times 40 = 280$ , and observing that $7 \times 39 < 7 \times 40 < 290$ to justify the claim.	<b>2</b>

**Score = 10/18, Level 3: Meeting Standards**



## Wendy's Windows

Wendy has just started a new business making windows for houses. The homeowner tells Wendy the measurements of the window, and she makes the glass and the frame. Wendy has decided that she should keep track of the measurements for each window she makes.



Wendy has started a table with some of the sizes of the windows she makes, but the table is incomplete.

**Window Sizes**

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

**1 Compare Window A (2 feet by 4 feet) and Window D (6 feet by 8 feet):**

How much longer is the perimeter of the larger window? 28 feet longer

How many times larger is the area of the larger window? 88 times larger

$$\begin{array}{r} 96 \\ - 8 \\ \hline 88 \end{array} \quad \begin{array}{r} 40 \\ - 12 \\ \hline 28 \end{array}$$

**T1**

The response demonstrates an incorrect process for solving a problem involving multiplicative vs. additive comparison and distinguishing the difference, as an additive comparison is used in both situations. In addition, Window A has been compared to Window B ( $40 - 12 = 18$ ,  $96 - 8 = 88$ ), which may indicate a misconception regarding the information to be determined. There may also be a misconception regarding the operations associated with the phrases "feet longer" and "times larger."



Window Sizes

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

2 What is the length of Window C?

19 r 2 feet

Show your work.

$$\begin{array}{r} 8 \times 10 = 80 \\ 8 \times 5 = 40 \\ 8 \times \underline{4} = \underline{32} + \\ 19 \quad 142 \end{array}$$

T2

The response shows some steps of the beginning of a correct process for applying the area formula of rectangles, viewing the problem as a multiplication equation with an unknown factor, and attempting to find the number of groups of 8 that will make 144. A computational error when adding 80, 40, and 32 leads to an incorrect answer. It is reasonable to assume that the remainder of 2 is meant to account for the difference between 144 and 142.

3 What is the length and width of the window with the 96 square foot area?

Length: 8 feet

Width: 12 feet

Show your work.

$$\begin{array}{lll} 1, 96 = 97 & 4, 24 = 28 & 8 \times 12 = 96 \\ 2, 48 = 50 & 6, 16 = 22 & 8 + 12 = 20 \\ 3, 32 = 39 & 8, 12 = 20 & \end{array}$$

T3

The response shows a correct process for solving a problem involving area and perimeter by finding factor pairs. The response shows an understanding of the perimeter of a rectangle, as the factors of 96 are added until a sum of 20 is found.



- 4 What is the area, in square inches, of a window that is 4 feet long and 54 inches wide?

116 square inches

Show your work.

$$54 \text{ inches} = 4 \frac{1}{2} \text{ feet}$$

$$4 \times 4 \frac{1}{2} = 18$$

$$18 \text{ feet} = 116 \text{ inches}$$

$$\begin{array}{r} 18 \\ \times 12 \rightarrow 12 \text{ inches in 1 foot} \\ \hline 16 \\ 80 \\ 120 \\ + 100 \\ \hline 116 \end{array}$$

	1	2	3	4	
	5	6	7	8	17
4	9	10	11	12	
	13	14	15	16	18
X		4		+ 1/2	

T4

The response shows the beginning of a correct process for finding the area of a rectangle by multiplying 2 two-digit numbers. The response shows an understanding that the units of measure for the length and width of the rectangle must be the same. A misconception regarding the units of measure is shown as 18 feet is multiplied by 12 and 144. The response also shows some understanding of multiplying a two-digit number by a two-digit number, as three of the four partial products are correct. It is reasonable to infer that  $12 \times 10$  was computed in place of  $2 \times 10$ . There is also a misconception shown in the response with regard to the addition of the four products in finding the area.





One homeowner asked Wendy to make several pairs of small windows for his house. For each pair, the owner would like one window to be square and the other to be one inch longer on one side and one inch shorter on the other side. Wendy makes a table that can be used later to find the cost of the pairs of windows.

- 5a** Find the area of each rectangular window for Wendy so her table will be complete. Write your answers in the table.

**Square Windows**

Length	Width	Area
9 inches	9 inches	81 square inches
10 inches	10 inches	100 square inches
11 inches	11 inches	121 square inches

**Rectangular Windows**

Length	Width	Area
8 inches	10 inches	<u>81</u> square inches
9 inches	11 inches	<u>100</u> square inches
10 inches	12 inches	<u>121</u> square inches

- 5b** If Wendy makes a square window that measures 23 inches long by 23 inches wide, with an area of 529 square inches, what is the area of the rectangular window that measures 24 inches long by 22 inches wide?

529 square inches

**T5**

The response shows misconceptions about multiplication, shown in the errors in the table and the description given. The response indicates that if two numbers are multiplied, their product will be the same if one number is decreased by 1 while the other is increased by 1.

- 5c** Identify the pattern in the table and explain how you know the area of the rectangular window that measures 24 inches long by 22 inches wide without calculating the actual area.

I saw they did one less and one more so it's technically the same number as before so you can just copy it.



- 6 When Wendy makes a pair of windows, each window in the pair will be made of different glass. The 8 inch by 8 inch square window has an area of 64 square inches and the glass costs 20¢ for each square inch. The 7 inch by 9 inch rectangular window has an area of 63 square inches and the glass costs 10¢ for each square inch.

What is the total cost of the glass for this pair of windows? 1910¢

Show your work.

$\begin{array}{c} 8 \\ 8 \times 8 \\ \hline 64 \end{array}$	$\begin{array}{c} 9 \\ 7 \times 9 \\ \hline 63 \end{array}$	
$\begin{array}{r} 64 \\ \times 20 \\ \hline 1280 \end{array}$	$\begin{array}{r} 63 \\ \times 10 \\ \hline 630 \end{array}$	$\begin{array}{r} 1280 \\ + 630 \\ \hline 1910 \end{array}$

T6

The response shows a correct process for using the four operations to solve word problems involving money. An overall understanding of the context of the trait is shown by the strategic use of multiplication and addition in finding the total cost.

- 7 Wendy has 290 square feet of glass. She would like to use the glass to make windows that each have an area of 7 square feet. She thinks she can only make 39 windows.

However, Wendy is incorrect. Use estimation to explain why Wendy's thinking is incorrect.

Wendy's thinking is wrong because 290 rounded is 300 and 7 rounded is 10 and  $300 \div 10 = 30$ .

39 rounded is 40. Wendy is about 10 windows off and that is a big difference.

T7

The response shows the beginning of a correct process to assess the reasonableness of an answer using estimation strategies, including rounding. There is a strategic misconception shown regarding the quantity to be rounded as the area of the 7 square foot window, and the 290 square foot area of glass is rounded to the nearest ten, in addition to rounding the amount of windows to be produced. It may be that there is a misconception regarding which units of measure are fixed and which are estimates.

# Sample D - Anchor Paper Commentary

**Subject/Course:** Math

**Task Title:** Wendy's Windows

**Grade Level:** 4

**Year:** 2015-2016

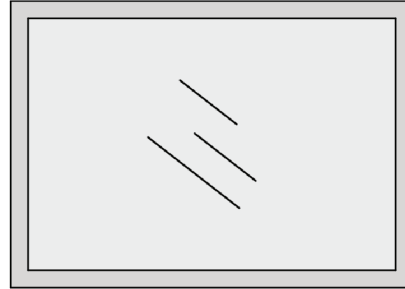
Rubric Traits	Anchor Score	Commentary/Rationale	Maximum Score
<b>T1</b> Trait 1	0	Two incorrect answers, 28 feet and 88 times larger, are given.	2
<b>T2</b> Trait 2	0	An incorrect answer of 19 R2 is given, and an incorrect process is used to find the length of the window. There is not enough evidence to show the beginning of a correct process.	2
<b>T3</b> Trait 3	3	A correct answer of 8 feet and 12 feet is given, and a correct process is shown, looking at factor pairs of 96 until a total of 20 (half the perimeter) is found.	3
<b>T4</b> Trait 4	1	An incorrect answer of 116 square inches is given. A correct process is started, converting 54 inches to 4 ½ feet in order to find the area in square feet. The process to convert to square inches is incorrect, given by $18 \times 12 = 116 \text{ in}^2$ .	3
<b>T5</b> Trait 5 (a-c)	0	None of the correct areas are given in the table or for the 22 in. $\times$ 24 in. window. The explanation for the area of the 22 in. $\times$ 24 in. window and for the areas in the table is also incorrect.	4
<b>T6</b> Trait 6	2	A correct answer of 1910¢ is given and a correct process is shown to find the total cost for both windows, given by $64 \times 20 = 1280$ and $63 \times 10 = 630$ , which leads to the correct answer in cents given by $1280 + 630 = 1910$ .	2
<b>T7</b> Trait 7	1	Estimation is used to show that Wendy is incorrect. An incorrect explanation is given by 290 being rounded to 300, 7 being rounded to 10, and $300 \div 10 = 30$ , which leads to the incorrect comparison $30 < 40$ .	2

**Score = 7/18, Level 2: Approaching Standards**



## Wendy's Windows

Wendy has just started a new business making windows for houses. The homeowner tells Wendy the measurements of the window, and she makes the glass and the frame. Wendy has decided that she should keep track of the measurements for each window she makes.



Wendy has started a table with some of the sizes of the windows she makes, but the table is incomplete.

**Window Sizes**

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

**1 Compare Window A (2 feet by 4 feet) and Window D (6 feet by 8 feet):**

How much longer is the perimeter of the larger window? 16 feet longer

How many times larger is the area of the larger window? 6 times larger

**T1**

The response shows an understanding of solving problems involving multiplicative vs. additive comparison and distinguishing the difference, as answers are correct. It can be assumed that a correct process was used to find the answers ( $28 - 12 = 16$ ,  $48 \div 8 = 6$ ), as showing work was not required.



### Window Sizes

Window	Length	Width	Area	Perimeter
A	2 feet	4 feet	8 square feet	12 feet
B			96 square feet	40 feet
C		8 feet	144 square feet	
D	6 feet	8 feet	48 square feet	28 feet

2 What is the length of Window C?

18 feet

Show your work.

T2

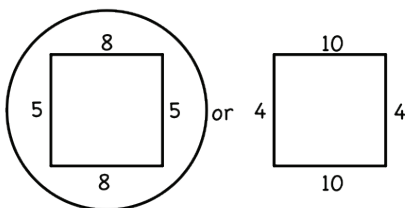
The response shows some understanding of applying the area formula for rectangles, viewing the problem as a multiplication equation and finding the unknown factor. From the response it is unclear what process was used to find the correct answer.

3 What is the length and width of the window with the 96 square foot area?

Length: 5 feet

Width: 8 feet

Show your work.



T3

The response shows an incorrect process for finding the length and width of the rectangle. It may be that there was a misconception with regard to the factors of 96, which would account for the choice of an area of 40, or that there was a misconception with regard to the context of the problem, since the length and width of the rectangle needs to satisfy two conditions.



- 4 What is the area, in square inches, of a window that is 4 feet long and 54 inches wide?

216 square inches

**Show your work.**

$$54 \times 4 = 216$$

T4

The response shows misconceptions about working within a measurement system to express a larger unit in terms of a smaller unit and solving problems that require such conversions, as feet are multiplied by inches and no units are labeled, nor is a drawing shown to explain the work. An understanding of applying the formula for the area of a rectangle is shown, as length is multiplied by width. The response shows a correct process for multiplying a two-digit number by a one-digit number.



One homeowner asked Wendy to make several pairs of small windows for his house. For each pair, the owner would like one window to be square and the other to be one inch longer on one side and one inch shorter on the other side. Wendy makes a table that can be used later to find the cost of the pairs of windows.

- 5a** Find the area of each rectangular window for Wendy so her table will be complete. Write your answers in the table.

Square Windows			Rectangular Windows		
Length	Width	Area	Length	Width	Area
9 inches	9 inches	81 square inches	8 inches	10 inches	<u>80</u> square inches
10 inches	10 inches	100 square inches	9 inches	11 inches	<u>90</u> square inches
11 inches	11 inches	121 square inches	10 inches	12 inches	<u>100</u> square inches

- 5b** If Wendy makes a square window that measures 23 inches long by 23 inches wide, with an area of 529 square inches, what is the area of the rectangular window that measures 24 inches long by 22 inches wide?

408 square inches

**T5**

The response shows an incorrect explanation of the pattern from the table. The table is partially correct, but the area of the 22 in.  $\times$  24 in. window is found by multiplying and not by looking for a pattern. The response also shows a misconception about the process of multiplying 2 two-digit numbers, as only two of four partial products are shown.

- 5c** Identify the pattern in the table and explain how you know the area of the rectangular window that measures 24 inches long by 22 inches wide without calculating the actual area.

I just times  $20 \times 20 = 400$  and  $2 \times 4 = 8$ .



- 6 When Wendy makes a pair of windows, each window in the pair will be made of different glass. The 8 inch by 8 inch square window has an area of 64 square inches and the glass costs 20¢ for each square inch. The 7 inch by 9 inch rectangular window has an area of 63 square inches and the glass costs 10¢ for each square inch.

What is the total cost of the glass for this pair of windows? 480¢

Show your work.

$$\begin{array}{r} 20 \\ \times 8 \\ \hline 160 \\ + 160 \\ \hline 320\text{¢} \end{array}$$

$$\begin{array}{r} 10 \\ \times 7 \\ \hline 70 \\ + 90 \\ \hline 160\text{¢} \end{array}$$

$$\begin{array}{r} 10 \\ \times 9 \\ \hline 90 \\ + 320\text{¢} \\ \hline 480\text{¢} \end{array}$$

T6

The response shows an incorrect process for finding the total cost. The response shows some understanding of using the four operations to solve word problems involving money, as multiplication is used to find the cost of each window, and then addition is used to find the total cost. There is a misconception about area, as each dimension of each window is multiplied by the respective cost ( $20\text{¢} \times 8$  added twice for each 8 in. side,  $10\text{¢} \times 7 + 10\text{¢} \times 9$  for the side lengths of the second window).

- 7 Wendy has 290 square feet of glass. She would like to use the glass to make windows that each have an area of 7 square feet. She thinks she can only make 39 windows.

However, Wendy is incorrect. Use estimation to explain why Wendy's thinking is incorrect.

I think it will be near the 40 mark because 290 feet is big.

T7

The response may show some understanding of assessing the reasonableness of an answer using estimation strategies, including rounding. There is not enough evidence to demonstrate an understanding of the correct process of using estimation, even though 39 is rounded to 40. There may be a misconception regarding the area of each window with respect to the area of glass to be used.



# Sample E - Anchor Paper Commentary

**Subject/Course:** Math

**Task Title:** Wendy's Windows

**Grade Level:** 4

**Year:** 2015-2016

Rubric Traits	Anchor Score	Commentary/Rationale	Maximum Score
<b>T1</b> Trait 1	<b>2</b>	Two correct answers, 16 feet and 6 times larger, are given.	<b>2</b>
<b>T2</b> Trait 2	<b>1</b>	A correct answer of 18 feet is given, and no work is shown.	<b>2</b>
<b>T3</b> Trait 3	<b>0</b>	An incorrect answer of 5 feet and 8 feet is given, and an incorrect process is shown, finding a rectangle with an area of 40 ft <sup>2</sup> .	<b>3</b>
<b>T4</b> Trait 4	<b>0</b>	An incorrect answer of 216 square inches is given. An incorrect process is shown, as feet are multiplied by inches, given by $54 \times 4 = 216$ .	<b>3</b>
<b>T5</b> Trait 5 (a-c)	<b>1</b>	One correct area of 80 in <sup>2</sup> is given, and a pattern of multiples of 10 is shown. The area of the 22 in. $\times$ 24 in. window is not correct, and is not based on a description of a pattern. The pattern from the table is not identified.	<b>4</b>
<b>T6</b> Trait 6	<b>0</b>	An incorrect answer of 480¢ is given, and an incorrect process is used to find the total cost of the two windows.	<b>2</b>
<b>T7</b> Trait 7	<b>0</b>	An incorrect explanation using estimation is shown. Rounding 39 to 40 is not enough of an explanation to be considered the beginning of a correct explanation.	<b>2</b>

**Score = 4/18, Level 1: Attempting Standards**

# Trait to Standard Alignment Chart

		Common Core Standards											
Trait	Question	K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Algebra 1	Algebra 2	Geometry
1	1	K.CC.1	1.NBT.1	2.NBT.4	3.MD.7b	4.OA.2	3.NF.1	6.RP.1	7.EE.3	8.F.4	F.IF.4	G.SRT.8	G.CO.9
2	2	K.CC.2	2.NBT.2	2.NBT.4	3.OA.6	4.MD.3	5.NF.1	6.RP.3a	7.EE.1	8.F.4	F.IF.6	G.SRT.8	G.CO.10
3	3	1.NBT.1	1.NBT.5	2.NBT.7	4.NBT.6	4.OA.4	5.NF.1	6.EE.9	7.RP.3	8.F.4	F.BF.1a,b and F.BF.2	G.SRT.8	G.SRT.4
4	4	K.CC.1	2.NBT.8	2.NBT.4	3MD.7b	4.NBT.5	5.NF.4a	6.RP.3c	7.EE.2	8.EE.8b	4.OA.5	G.SRT.8	G.SRT.5
5	5	1.NBT.5	1.NBT.1	2.NBT.1	3.NBT.3	4.OA.5	5.NF.2	6.RP.3b	7.EE.2	8.EE.8a	F.BF.1a,b and F.BF.2	F.BF.1a	G.SRT.5
6	6	K.CC.3	2.NBT.3	2.NBT.1	3.OA.3	4.MD.2	5.NF.3	6.RP.2	7.RP.3	8.F.2	F.IF.5	F.TF.8	G.CO.5
7	7	1.NBT.1	1.NBT.3		3.OA.8	4.OA.3	5.NF.7b	6.RP.3	7.EE.4b	8.F.4	A.REI.7		G.SRT.5
8	8	K.CC.4	2.NBT.4				5.NF.7a				A.SSE.3a		
9	9	K.CC.6	1.OA.7										
10	10	1.NBT.3	2.OA.2										
11	11	K.OA.1	1.OA.1										
12	12	1.OA.7	2.OA.1										
13	13	K.OA.2											
14	14	1.OA.1											